

#4

## SEQUENCE LISTING

<110> BOURSAUX-EUDE, CAROLINE  
GUISO-MACLOUF, NICOLE

<120> POLYPEPTIDES CONTAINING POLYMORPHISMS OF THE REPEATED  
REGIONS OF PERTACTIN IN BORDETELLA PERTUSSIS,  
BORDETELLA PARAPERTUSSIS, AND BORDETELLA  
BRONCHISEPTICA, THEIR USE IN DIAGNOSTICS, AND IN  
IMMUNOGENIC COMPOSITIONS

<130> 03495-0206-00000

<140> 09/855,754

<141> 2001-05-16

<150> 60/206,969

<151> 2000-05-25

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<170> PatentIn Ver. 2.1

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<213> Bordetella bronchiseptica

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<213> Bordetella pertussis

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 Thr Thr Leu Ala Met Ala Leu Gly Ala Leu Gly Ala Ala Pro Ala Ala  
 20 25 30  
 His Ala Asp Trp Asn Asn Gln Ser Ile Val Lys Thr Gly Glu Arg Gln  
 35 40 45  
 His Gly Ile His Ile Gln Gly Ser Asp Pro Gly Gly Val Arg Thr Ala  
 50 55 60  
 Ser Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Ile Leu  
 65 70 75 80  
 Leu Glu Asn Pro Ala Ala Glu Leu Gln Phe Arg Asn Gly Ser Val Thr  
 85 90 95  
 Ser Ser Gly Gln Leu Ser Asp Asp Gly Ile Arg Arg Phe Leu Gly Thr  
 100 105 110  
 Val Thr Val Lys Ala Gly Lys Leu Val Ala Asp His Ala Thr Leu Ala  
 115 120 125

Asn	Val	Gly	Asp	Thr	Trp	Asp	Asp	Asp	Gly	Ile	Ala	Leu	Tyr	Val	Ala
130						135					140				
Gly	Glu	Gln	Ala	Gln	Ala	Ser	Ile	Ala	Asp	Ser	Thr	Leu	Gln	Gly	Ala
145					150					155					160
Gly	Gly	Val	Gln	Ile	Glu	Arg	Gly	Ala	Asn	Val	Thr	Val	Gln	Arg	Ser
				165					170					175	
Ala	Ile	Val	Asp	Gly	Gly	Leu	His	Ile	Gly	Ala	Leu	Gln	Ser	Leu	Gln
			180					185					190		
Pro	Glu	Asp	Leu	Pro	Pro	Ser	Arg	Val	Val	Leu	Arg	Asp	Thr	Asn	Val
		195					200					205			
Thr	Ala	Val	Pro	Ala	Ser	Gly	Ala	Pro	Ala	Ala	Val	Ser	Val	Leu	Gly
	210					215					220				
Ala	Ser	Glu	Leu	Thr	Leu	Asp	Gly	Gly	His	Ile	Thr	Gly	Gly	Arg	Ala
225					230					235					240
Ala	Gly	Val	Ala	Ala	Met	Gln	Gly	Ala	Val	Val	His	Leu	Gln	Arg	Ala
			245						250					255	
Thr	Ile	Arg	Arg	Gly	Asp	Ala	Pro	Ala	Gly	Gly	Ala	Val	Pro	Gly	Gly
			260					265					270		
Ala	Val	Pro	Gly	Gly	Ala	Val	Pro	Gly	Gly	Phe	Gly	Pro	Gly	Gly	Phe
		275					280					285			
Gly	Pro	Val	Leu	Asp	Gly	Trp	Tyr	Gly	Val	Asp	Val	Ser	Asp	Ser	Ser
	290					295					300				
Val	Glu	Leu	Ala	Gln	Ser	Ile	Val	Glu	Ala	Pro	Glu	Leu	Gly	Ala	Ala
305				310						315					320
Ile	Arg	Val	Gly	Arg	Gly	Ala	Arg	Val	Thr	Val	Ser	Gly	Gly	Ser	Leu
				325					330					335	
Ser	Ala	Pro	His	Gly	Asn	Val	Ile	Glu	Thr	Gly	Gly	Ala	Arg	Arg	Phe
			340					345					350		
Ala	Pro	Gln	Ala	Ala	Pro	Leu	Ser	Ile	Thr	Leu	Gln	Ala	Gly	Ala	His
		355					360					365			
Ala	Gln	Gly	Lys	Ala	Leu	Leu	Tyr	Arg	Val	Leu	Pro	Glu	Pro	Val	Lys
	370					375					380				
Leu	Thr	Leu	Thr	Gly	Gly	Ala	Asp	Ala	Gln	Gly	Asp	Ile	Val	Ala	Thr
385					390					395					400
Glu	Leu	Pro	Ser	Ile	Pro	Gly	Thr	Ser	Ile	Gly	Pro	Leu	Asp	Val	Ala
				405					410					415	
Leu	Ala	Ser	Gln	Ala	Arg	Trp	Thr	Gly	Ala	Thr	Arg	Ala	Val	Asp	Ser
			420					425					430		



Leu Ser Ile Asp Asn Ala Thr Trp Val Met Thr Asp Asn Ser Asn Val  
 435 440 445  
 Gly Ala Leu Arg Leu Ala Ser Asp Gly Ser Val Asp Phe Gln Gln Pro  
 450 455 460  
 Ala Glu Ala Gly Arg Phe Lys Val Leu Thr Val Asn Thr Leu Ala Gly  
 465 470 475 480  
 Ser Gly Leu Phe Arg Met Asn Val Phe Ala Asp Leu Gly Leu Ser Asp  
 485 490 495  
 Lys Leu Val Val Met Gln Asp Ala Ser Gly Gln His Arg Leu Trp Val  
 500 505 510  
 Arg Asn Ser Gly Ser Glu Pro Ala Ser Ala Asn Thr Leu Leu Leu Val  
 515 520 525  
 Gln Thr Pro Arg Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp  
 530 535 540  
 Gly Lys Val Asp Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly  
 545 550 555 560  
 Asn Gly Gln Trp Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys  
 565 570 575  
 Pro Ala Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln  
 580 585 590  
 Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala  
 595 600 605  
 Ala Ala Asn Ala Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr  
 610 615 620  
 Leu Trp Tyr Ala Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu  
 625 630 635 640  
 Arg Leu Asn Pro Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln  
 645 650 655  
 Arg Gln Gln Leu Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val  
 660 665 670  
 Ala Gly Phe Glu Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly  
 675 680 685  
 Arg Trp His Leu Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly  
 690 695 700  
 Phe Thr Gly Asp Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly  
 705 710 715 720  
 Tyr Ala Thr Tyr Ile Ala Asp Ser Gly Phe Tyr Leu Asp Ala Thr Leu  
 725 730 735

Arg Ala Ser Arg Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly  
                     740                    745                    750  
 Tyr Ala Val Lys Gly Lys Tyr Arg Thr His Gly Val Gly Ala Ser Leu  
                     755                    760                    765  
 Glu Ala Gly Arg Arg Phe Thr His Ala Asp Gly Trp Phe Leu Glu Pro  
                     770                    775                    780  
 Gln Ala Glu Leu Ala Val Phe Arg Ala Gly Gly Gly Ala Tyr Arg Ala  
                     785                    790                    795                    800  
 Ala Asn Gly Leu Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly  
                     805                    810                    815  
 Arg Leu Gly Leu Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg  
                     820                    825                    830  
 Gln Val Gln Pro Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly  
                     835                    840                    845  
 Ala Gly Thr Val His Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg  
                     850                    855                    860  
 Gly Thr Arg Ala Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg  
                     865                    870                    875                    880  
 Gly His Ser Leu Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu  
                     885                    890                    895  
 Ala Met Pro Trp Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp  
                     900                    905                    910

<210> 6

<211> 922

<212> PRT

<213> Bordetella parapertussis

<400> 6

Met Asn Met Ser Leu Ser Arg Ile Val Lys Ala Ala Pro Leu Arg Arg  
   1                    5                    10                    15  
 Thr Thr Leu Ala Met Ala Leu Gly Ala Leu Gly Ala Ala Pro Ala Ala  
                     20                    25                    30  
 Tyr Ala Asp Trp Asn Asn Gln Ser Ile Ile Lys Ala Gly Glu Arg Gln  
                     35                    40                    45  
 His Gly Ile His Ile Lys Gln Ser Asp Gly Ala Gly Val Arg Thr Ala  
                     50                    55                    60  
 Thr Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Val Leu  
                     65                    70                    75                    80  
 Leu Glu Asn Pro Ala Ala Glu Leu Arg Phe Gln Asn Gly Ser Val Thr  
                     85                    90                    95

Ser Ser Gly Gln Leu Phe Asp Glu Gly Val Arg Arg Phe Leu Gly Thr  
 100 105 110  
 Val Thr Val Lys Ala Gly Lys Leu Val Ala Asp His Ala Thr Leu Ala  
 115 120 125  
 Asn Val Ser Asp Thr Arg Asp Asp Asp Gly Ile Ala Leu Tyr Val Ala  
 130 135 140  
 Gly Glu Gln Ala Gln Ala Ser Ile Ala Asp Ser Thr Leu Gln Gly Ala  
 145 150 155 160  
 Gly Gly Val Arg Val Glu Arg Gly Ala Asn Val Thr Val Gln Arg Ser  
 165 170 175  
 Thr Ile Val Asp Gly Gly Leu His Ile Gly Thr Leu Gln Pro Leu Gln  
 180 185 190  
 Pro Glu Asp Leu Pro Pro Ser Arg Val Val Leu Gly Asp Thr Ser Val  
 195 200 205  
 Thr Ala Val Pro Ala Ser Gly Ala Pro Ala Ala Val Phe Val Phe Gly  
 210 215 220  
 Ala Asn Glu Leu Thr Val Asp Gly Gly His Ile Thr Gly Gly Arg Ala  
 225 230 235 240  
 Ala Gly Val Ala Ala Met Asp Gly Ala Ile Val His Leu Gln Arg Ala  
 245 250 255  
 Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val Pro Gly Gly  
 260 265 270  
 Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp  
 275 280 285  
 Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln  
 290 295 300  
 Ser Ile Val Glu Ala Pro Gln Leu Gly Ala Ala Ile Arg Ala Gly Arg  
 305 310 315 320  
 Gly Ala Arg Val Thr Val Ser Gly Gly Ser Leu Ser Ala Pro His Gly  
 325 330 335  
 Asn Val Ile Glu Thr Gly Gly Gly Ala Arg Arg Phe Pro Pro Pro Ala  
 340 345 350  
 Ser Pro Leu Ser Ile Thr Leu Gln Ala Gly Ala Arg Ala Gln Gly Arg  
 355 360 365  
 Ala Leu Leu Tyr Arg Val Leu Pro Glu Pro Val Lys Leu Thr Leu Ala  
 370 375 380  
 Gly Gly Ala Gln Gly Gln Gly Asp Ile Val Ala Thr Glu Leu Pro Pro  
 385 390 395 400

Ile Pro Gly Ala Ser Ser Gly Pro Leu Asp Val Ala Leu Ala Ser Gln  
 405 410 415  
 Ala Arg Trp Thr Gly Ala Thr Arg Ala Val Asp Ser Leu Ser Ile Asp  
 420 425 430  
 Asn Ala Thr Trp Val Met Thr Asp Asn Ser Asn Val Gly Ala Leu Arg  
 435 440 445  
 Leu Ala Ser Asp Gly Ser Val Asp Phe Gln Gln Pro Ala Glu Ala Gly  
 450 455 460  
 Arg Phe Lys Val Leu Met Val Asp Thr Leu Ala Gly Ser Gly Leu Phe  
 465 470 475 480  
 Arg Met Asn Val Phe Ala Asp Leu Gly Leu Ser Asp Lys Leu Val Val  
 485 490 495  
 Met Arg Asp Ala Ser Gly Gln His Arg Leu Trp Val Arg Asn Ser Gly  
 500 505 510  
 Ser Glu Pro Ala Ser Gly Asn Thr Met Leu Leu Val Gln Thr Pro Arg  
 515 520 525  
 Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp Gly Lys Val Asp  
 530 535 540  
 Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly Asn Gly Gln Trp  
 545 550 555 560  
 Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln  
 565 570 575  
 Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro  
 580 585 590  
 Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro  
 595 600 605  
 Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala Ala Asn Ala  
 610 615 620  
 Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr Leu Trp Tyr Ala  
 625 630 635 640  
 Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu Arg Leu Asn Pro  
 645 650 655  
 Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln Arg Gln Gln Leu  
 660 665 670  
 Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val Ala Gly Phe Glu  
 675 680 685  
 Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly Arg Trp His Leu  
 690 695 700

Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly Phe Thr Gly Asp  
 705 710 715 720  
 Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly Tyr Ala Thr Tyr  
 725 730 735  
 Ile Ala Asn Ser Gly Phe Tyr Leu Asp Ala Thr Leu Arg Ala Ser Arg  
 740 745 750  
 Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly Tyr Ala Val Lys  
 755 760 765  
 Gly Lys Tyr Arg Thr His Gly Val Gly Val Ser Leu Glu Ala Gly Arg  
 770 775 780  
 Arg Phe Ala His Ala Asp Gly Trp Phe Leu Glu Pro Gln Ala Glu Leu  
 785 790 795 800  
 Ala Val Phe Arg Val Gly Gly Gly Ala Tyr Arg Ala Ala Asn Gly Leu  
 805 810 815  
 Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly Arg Leu Gly Leu  
 820 825 830  
 Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg Gln Val Gln Pro  
 835 840 845  
 Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly Ala Gly Thr Val  
 850 855 860  
 Arg Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg Gly Thr Arg Ala  
 865 870 875 880  
 Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg Gly His Ser Leu  
 885 890 895  
 Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu Ala Met Pro Trp  
 900 905 910  
 Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp  
 915 920

<210> 7  
 <211> 51  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 7  
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val  
 1 5 10 15  
 Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro  
 20 25 30  
 Leu Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp  
 35 40 45

Leu Ala Gln  
50

<210> 8  
<211> 46  
<212> PRT  
<213> Bordetella bronchiseptica

<400> 8  
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val  
1 5 10 15  
Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp Gly Trp  
20 25 30  
Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln  
35 40 45

<210> 9  
<211> 56  
<212> PRT  
<213> Bordetella bronchiseptica

<400> 9  
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Gly Val  
1 5 10 15  
Pro Gly Gly Ala Val Pro Gly Gly Phe Asp Pro Gly Gly Phe Gly Pro  
20 25 30  
Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser  
35 40 45  
Gly Ser Thr Val Glu Leu Ala Gln  
50 55

<210> 10  
<211> 56  
<212> PRT  
<213> Bordetella bronchiseptica

<400> 10  
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val  
1 5 10 15  
Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro  
20 25 30  
Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser  
35 40 45  
Gly Ser Ser Val Glu Leu Ala Gln  
50 55

<210> 11  
 <211> 61  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 11  
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val  
           1                  5                  10                  15  
 Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro  
                   20                  25                  30  
 Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr  
           35                  40                  45  
 Gly Val Asp Val Ser Gly Ser Ser Val Glu Leu Ala Gln  
           50                  55                  60

<210> 12  
 <211> 56  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 12  
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val  
           1                  5                  10                  15  
 Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro  
                   20                  25                  30  
 Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser  
           35                  40                  45  
 Gly Ser Ser Val Glu Leu Ala Gln  
           50                  55

<210> 13  
 <211> 51  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 13  
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val  
           1                  5                  10                  15  
 Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro  
                   20                  25                  30  
 Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Gly Ser Ser Val Glu  
           35                  40                  45  
 Leu Ala Gln  
           50

<210> 14  
 <211> 49  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 14  
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
           1                  5                  10                  15  
 Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln  
                   20                  25                  30  
 Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala  
           35                  40                  45  
 Ala

<210> 15  
 <211> 52  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 15  
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
           1                  5                  10                  15  
 Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro  
                   20                  25                  30  
 Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu  
           35                  40                  45  
 Leu Ser Ala Ala  
           50

<210> 16  
 <211> 59  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 16  
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
           1                  5                  10                  15  
 Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln  
                   20                  25                  30  
 Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Pro Glu Ala Pro Ala Pro  
           35                  40                  45  
 Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala  
           50                  55



<210> 17  
 <211> 52  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 17  
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
 1 5 10 15  
 Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro  
 20 25 30  
 Pro Gln Arg Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu  
 35 40 45  
 Leu Ser Ala Ala  
 50

<210> 18  
 <211> 56  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 18  
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
 1 5 10 15  
 Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro  
 20 25 30  
 Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro  
 35 40 45  
 Ala Gly Arg Glu Leu Ser Ala Ala  
 50 55

<210> 19  
 <211> 58  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 19  
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
 1 5 10 15  
 Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro  
 20 25 30  
 Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln  
 35 40 45  
 Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala  
 50 55

<210> 20  
 <211> 48  
 <212> PRT

<213> *Bordetella bronchiseptica*

<400> 20

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
 1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro  
 20 25 30

Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala  
 35 40 45

<210> 21  
 <211> 52  
 <212> PRT

<213> *Bordetella bronchiseptica*

<400> 21

Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
 1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro  
 20 25 30

Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu  
 35 40 45

Leu Ser Ala Ala  
 50

<210> 22  
 <211> 54  
 <212> PRT

<213> *Bordetella bronchiseptica*

<400> 22

Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
 1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro  
 20 25 30

Gln Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly  
 35 40 45

Arg Glu Leu Ser Ala Ala  
 50

<210> 23  
 <211> 42  
 <212> PRT

<213> *Bordetella bronchiseptica*

&lt;400&gt; 23

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
 1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln  
 20 25 30

Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala  
 35 40

&lt;210&gt; 24

&lt;211&gt; 39

&lt;212&gt; PRT

&lt;213&gt; Bordetella bronchiseptica

&lt;400&gt; 24

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro  
 1 5 10 15

Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala  
 20 25 30

Gly Arg Glu Leu Ser Ala Ala  
 35